

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

<b>In re Patent Application of:</b> <b>William J. COLUCCI et al.</b>  <b>Application No.: 10/670,552</b>  <b>Filed: September 25, 2003</b>  <b>For: FUEL COMPOSITIONS AND</b> <b>METHODS FOR USING SAME</b>	<b>Group Art Unit: 1714</b>  <b>Examiner: Cephia D. Toomer</b>  <b>Confirmation No.: 5492</b>
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***MAIL STOP AMENDMENT***

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

Applicant submits this Amendment and Response to the Office Action mailed June 30, 2006.

**Amendments to the Specification** begin on page 2 of this paper.

**Amendments to the Claims** are reflected in the listing of claims which begins on page 3 of this paper.

**Remarks/Arguments** begin on page 6 of this paper.

AMENDMENTS TO THE SPECIFICATION

Replace the paragraph inserted at page 2, line 6 with the following paragraph:

However, as different engine types enter service worldwide, a fuel to power not only traditional multi-port fuel injected engines, but also gasoline direct injection engines will be required. The additives which work well as detergents in MPI engines will not necessarily work well in ~~GDI~~ DIG engines, and as such additional detergents prepared especially for DIG engines may be required as a "top-treat" type additive or as an after-market fuel supplement.

AMENDMENTS TO THE CLAIMS

This listing of claims replaces all prior versions, and listings, of claims in the application.

1. (Currently Amended) A fuel composition, comprising:

- (a) a spark-ignition fuel;
- (b) a Mannich base detergent; and
- (c) ~~deposit inhibitor~~ a succinimide compound, wherein the Mannich base detergent and succinimide compound are present in a ratio of detergent to succinimide of from about 16:1 to about 1000:1 by weight.

Claim 2 (Cancelled).

3. (Currently Amended) The fuel composition of claim 1, wherein the Mannich base detergent comprises ~~a Mannich base detergent comprising~~ the reaction product of an alkyl-substituted hydroxyaromatic compound, an amine, and an aldehyde.

4. (Currently Amended) The fuel composition of claim 1, wherein the Mannich base detergent comprises ~~a Mannich base detergent comprising~~ the reaction product of alkylated cresol, a primary or secondary alkylamine, and formaldehyde.

Claims 5 and 6 (Cancelled).

7. (Currently Amended) The fuel composition of claim ~~6~~ 1, wherein the succinimide compound comprises a reaction product obtained by reacting an alkenyl succinic anhydride, acid, acid-ester or lower alkyl ester with an amine containing at least one primary amine group.

Claims 8 and 9 (Cancelled).

10. (Original) The fuel composition of claim 1, wherein the spark-ignition fuel comprises gasoline.

11. (Original) The fuel composition of claim 1, wherein the spark-ignition fuel comprises a blend of hydrocarbons of the gasoline boiling range and a fuel-soluble oxygenated compound.

12. (Original) The fuel composition of claim 1, further comprising a carrier fluid selected from the group consisting of a mineral oil or a blend of mineral oils that have a viscosity index of less than about 120; one or more poly-alpha-olefin oligomers; one or more poly (oxyalkylene) compounds having an average molecular weight in the range of about 500 to about 3000; one or more polyalkenes; one or more polyalkyl-substituted hydroxyaromatic compounds; and mixtures thereof.

13. (Original) The fuel composition of claim 12, wherein the carrier fluid comprises at least one poly (oxyalkylene) compound.

14. (Original) The fuel composition of claim 1, further comprising at least one additive selected from the group consisting of additional dispersants/detergents, antioxidants, carrier fluids, metal deactivators, dyes, markers, corrosion inhibitors, biocides, antistatic additives, drag reducing agents, demulsifiers, dehazers, anti-icing additives, antiknock additives, anti-valve-seat recession additives, lubricity additives and combustion improvers.

Claims 15 and 16 (Cancelled).

17. (Currently Amended) The fuel composition of claim ~~1~~ 16, wherein the succinimide compound is ~~hydrocarbyl-substituted succinic anhydride derivatives comprise at least one member selected from the group consisting of hydrocarbyl succinimides, hydrocarbyl succinimides, hydrocarbyl succinimide-amides and hydrocarbyl succinimide-esters.~~

18. (Currently Amended) A method of minimizing or reducing injector deposits in a spark-ignition internal combustion engine, ~~said method comprises~~ comprising providing as fuel for the operation of said engine a fuel composition in accordance with claim 1.

19. (Currently Amended) A method for operating an electronic port fuel injected engine on an unleaded fuel composition which comprises introducing into an electronic port fuel injected engine<sub>1</sub> with the combustion intake charge<sub>1</sub> the fuel composition of claim 1.

20. (Currently Amended) A method for operating a direct injection gasoline engine on an unleaded fuel composition which comprises introducing into a direct injection gasoline engine<sub>1</sub> with the combustion intake charge<sub>1</sub> the fuel composition of claim 1.

Claims 21-22 (Cancelled).

**REMARKS/ARGUMENTS**

The amendments set out above and the following remarks are believed responsive to the points raised by the Office Action dated June 30, 2006. Reconsideration is respectfully requested.

Claims 2, 5, 6, 8, 9, 15, 16, and 21-22 have been cancelled, and claims 1, 3, 4, 7, 10-14 and 17-20 remain pending. Claims 1, 3, 4, 7, and 17-20 have been amended to describe the invention more clearly. For example, claim 1 has been amended to specify that the detergent is a Mannich base detergent, that the deposit inhibitor is a succinimide compound, and that the detergent and succinimide are present in a ratio of detergent to succinimide of from about 16:1 to about 1000:1 by weight. The amendments to claims 3, 4, 7, and 17-20 are essentially editorial in nature. The specification has also been amended to correct a typographical error. No new matter has been added, the bases for all of the amendments may be found within the original specification and claims.

Amended claim 1 is supported by original claim 1 and the specification at, for example, page 21, Table 3 (Fuel Sample 1).

Claims 2 and 17 were rejected under 35 U.S.C. §112, second paragraph. Claim 2 has been cancelled and claim 17 has been amended to delete the second occurrence of "hydrocarbyl succinimides". Accordingly, the rejections under 35 U.S.C. §112 have been obviated and should be withdrawn.

Claims 1-3 and 5-20 were rejected under 35 U.S.C. 102(a) or 102(e) as anticipated by U.S. Patent No. 6,458,172 to Macduff et al. (hereinafter referred to as "Macduff"). The rejection is respectfully traversed.

The present claims are directed to fuel compositions which control, i.e. reduce or eliminate, injector deposits in spark-ignition internal combustion engines. The presently claimed fuel compositions include a spark-ignition fuel, a Mannich base detergent, and a succinimide compound, where the Mannich base detergent and succinimide compound are present in a ratio of detergent to succinimide of from about 16:1 to about 1000:1 by weight. The inventors have surprisingly found that fuel compositions including the claimed ratio of a Mannich base detergent and a succinimide compound provide significant reductions in injector fouling. For example, the present specification discloses numerous examples of fuel compositions comprising

Mannich detergent and succinimide in the claimed ratio which provide significant reductions in injector deposits (as measured by percent flow loss) over fuel compositions which do not contain the detergent and succinimide in the claimed ratio (see e.g., pages 21-24, Tables 3-7).

Specifically, as seen in Table 3 of the present specification, Fuel Sample 1 which includes the claimed ratio of Mannich base detergent and succinimide compound results in a significantly smaller flow loss (i.e., fewer injector deposits) than the fuel samples which do not include the claimed ratio of Mannich detergent and succinimide. Similarly, as seen in Table 4, Fuel Sample 2 which includes a Mannich detergent and succinimide in the claimed ratio results in a significantly smaller flow loss than those fuel samples which do not include the Mannich detergent and succinimide in the claimed ratio.

In contrast with the presently claimed invention, Macduff is directed to reducing *intake valve* deposits and does not even mention reducing injector deposits. Furthermore, Macduff is directed to fuel additive compositions for reducing intake valve deposits which comprise a combination of detergents and fluidizers, and repeatedly teaches the importance of using a particular ratio of detergent to fluidizer to reduce intake valve deposits. While Macduff does disclose that the fuel compositions *may optionally include* a succinimide, Macduff does not disclose or even suggest utilizing a Mannich base detergent and a succinimide compound in a ratio of from about 16:1 to about 1000:1 by weight. Indeed, many of the examples in Macduff do not even include a succinimide, and in those examples which do include a succinimide, the proportions of Mannich detergent and succinimide are significantly outside the scope of the present claims. Thus, since Macduff does not disclose or suggest utilizing a Mannich base detergent and a succinimide compound in a ratio of from about 16:1 to about 1000:1 by weight to reduce injector deposits, one of ordinary skill in the art reading Macduff would not be led to the present invention. Accordingly, it is respectfully submitted that the amended claims are patentable over Macduff and that the rejection should be withdrawn.

Claims 1, 2, 8-11, 14-16 and 18-20 were rejected under 35 U.S.C. 102(b) as anticipated by U.S. Patent No. 5,997,593 to McDonnell et al. (hereinafter referred to as "McDonnell"). Claims 2, 8, 9, 15, and 16 have been cancelled. Therefore, the rejection of these claims is now moot. It is respectfully submitted that the currently pending claims are patentable over McDonnell.

The presently claimed fuel compositions include a spark-ignition fuel, a Mannich base detergent, and a succinimide compound, where the Mannich base detergent and succinimide compound are present in a ratio of detergent to succinimide of from about 16:1 to about 1000:1 by weight. There is simply no disclosure in McDonnell of utilizing a Mannich base detergent or a succinimide, let alone using them in the presently claimed ratio. McDonnell is directed to fuels with enhanced lubricity, and provides no pointer to one of skill in the art to utilize the presently claimed ratio of Mannich base detergent and succinimide to reduce injector deposits. Accordingly, McDonnell cannot anticipate or suggest the fuel compositions of the present claims, and thus, the rejection cannot be maintained.

Claims 1, 6-14 and 18-19 were rejected under 35 U.S.C. 102(b) as anticipated by U.S. Patent No. 5,551,957 to Cunningham et al. (hereinafter referred to as "Cunningham"). Since claims 6, 8, and 9 have been cancelled, the rejection of these claims is now moot. It is respectfully submitted that the currently pending claims are patentable over Cunningham.

Cunningham fails to disclose each and every element of the pending claims and therefore cannot anticipate the claims. For example, Cunningham does not disclose or suggest utilizing a Mannich base detergent in a fuel composition to reduce injector deposits. Furthermore, Cunningham provides no teaching or suggestion of the advantages of utilizing the presently claimed ratio of a Mannich base detergent and a succinimide to reduce injector deposits. Accordingly, Cunningham cannot anticipate or suggest the fuel compositions of the present claims, and thus, it is respectfully submitted that the rejection should be withdrawn.

Claims 1-4, 8-14 and 20 were rejected under 35 U.S.C. 102(b) as anticipated by WO 01/42399 to Aradi et al. (hereinafter referred to as "Aradi"). Since claims 2, 8, and 9 have been cancelled, the rejection of these claims is now moot. It is respectfully submitted that the currently pending claims are patentable over Aradi.

As the Office Action correctly notes, Aradi is directed to a fuel composition for direct injection engines including a Mannich detergent, but does not disclose or suggest utilizing succinimide deposit inhibitors. As clearly shown in the present specification, the presently claimed fuel compositions including the claimed ratio of Mannich detergent and succinimide provide improved control of injector deposits over fuel compositions including Mannich detergents alone. Since Aradi does not even mention utilizing succinimides, let alone utilizing



the claimed ratio of Mannich detergent and succinimide, Aradi cannot anticipate or suggest the present claims. Thus, the rejection cannot be maintained.

Claim 4 was rejected under 35 U.S.C. 103 as unpatentable over Macduff in view of U.S. Patent No. 4,231,759 to Udelhofen. It is respectfully submitted that currently pending claim 4 is patentable over the cited references.

The fuel composition of dependent claim 4 is patentably distinct for the reasons set forth above. The fact that Udelhofen may disclose alkylated cresol compounds is of no importance. Udelhofen simply does not cure the deficiencies of Macduff, and therefore the combination also fails to render the present claim obvious.

In summary, there is nothing in any of the cited references that would lead one of ordinary skill in the art to utilize a Mannich base detergent and a succinimide in the presently claimed ratio to control fuel injector deposits.

For the reasons set forth above, reconsideration of the rejections is respectfully requested. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

### **FEES**

It is believed there are no fees associated with this filing. However, in the event the calculations are incorrect, the Commissioner is hereby authorized to charge any deficiencies in fees or credit any overpayment associated with this communication to Deposit Account No. 05-1372.

Respectfully submitted,

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